

06/02/00  
JCT 72 U.S. PTO

JCT 833 U.S. PTO  
09/585441  
06/02/00

# UTILITY PATENT APPLICATION TRANSMITTAL

Attorney Docket No. 8733.20113  
First Inventor or Application Identifier JONG DAE PARK  
Title WIRE CONNECTING DEVICE

## APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents

1. ☒ Fee Transmittal Form (e.g. PTO/SB/17)  
(Submit an original and a duplicate for fee processing)
2. ☒ Specification Total Pages **13**
3. ☒ Drawing(s) (35 U.S.C. 113) Total Sheets **5**
4. ☒ Oath or Declaration Total Pages **3**
  - a. ☒ Newly executed (original or copy)
  - b. ☐ Copy from a prior application (37 C.F.R. §1.63(d))  
(for continuation/divisional with box 15 completed)
    - i. ☐ DELETION OF INVENTOR(S)  
Signed statement attached deleting inventor(s) named  
in the prior application, see 37 C.F.R. §1.63(d)(2) and  
1.33(b).
5. ☐ Incorporation By Reference (usable if box 4B is checked)  
The entire disclosure of the prior application, from which a copy of the  
oath or declaration is supplied under Box 4B, is considered to be part  
of the disclosure of the accompanying application and is hereby  
incorporated by reference therein.

ADDRESS TO: Assistant Commissioner for Patents  
Box Patent Application  
Washington, DC 20231

## ACCOMPANYING APPLICATION PARTS

6. ☒ Assignment Papers (cover sheet & document(s))
7. ☐ 37 C.F.R. §3.73(b) Statement ☐ Power of Attorney  
(when there is an assignee)
8. ☐ English Translation Document (if applicable)
9. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations
10. ☐ Preliminary Amendment
11. ☒ White Advance Serial No. Postcard
12. ☐ Small Entity Statement(s) ☐ Statement filed in prior application. Status still proper and desired.
13. ☐ Certified Copy of Priority Document(s)  
(if foreign priority is claimed)
14. ☒ Other: Request for Priority

## 15. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below:


☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application no.:  
Prior application information: Examiner: Group Art Unit:

## 16. Amend the specification by inserting before the first line the sentence:

☐ This application is a ☐ Continuation ☐ Division ☐ Continuation-in-part (CIP)  
of application Serial No. Filed on  
☐ This application claims priority of provisional application Serial No. Filed

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**U.S. PATENT APPLICATION**

**OF**

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**SE CHANG WON**

**AND**

**IN SUK JUNG**

**FOR**

**WIRE CONNECTING DEVICE**

# WIRE CONNECTING DEVICE

## BACKGROUND OF THE INVENTION

### Field of the Invention

This invention relates to a device for connecting wires, and more particularly to a connecting device that is capable of preventing deterioration or breakage of a wire connected to a lamp electrode of a liquid crystal display module.

### Description of the Related Art

Generally, a liquid crystal display (LCD) controls the light transmissivity of liquid crystal cells to display a picture corresponding to video signals. The LCD employs an external light unlike display devices such as a cathode ray tube (CRT) that generates a light by itself. The LCD usually uses a back light unit as an external light source, positioned behind and to one side of a liquid crystal display panel. The back light unit includes a lamp for generating light, a light guide plate for guiding the light generated from the lamp located at the side of the LCD panel into the liquid crystal module, and a lamp housing installed at the side of the light guide plate in such a manner as to surround the lamp, so as to improve the light utilization of the lamp. The lamp is connected to a wire that serves as the power supply path. The electrode of the lamp and the wire are usually connected to each other by a soldering method using lead-containing solder. However, when the wire connected by the soldering method is moved, it is liable to deteriorate or break. This problem will be described with reference to the accompanying drawings below.

Figure 1 is an exploded view of a soldering part between a lamp and a wire in a back light unit, and Figure 2 illustrates a soldered state between the lamp and the wire illustrated in Figure 1. In Figure 1 and Figure 2, the wire 4 passes through a lamp holder 6 to be connected

to an electrode 8 of the lamp 2. The lamp 2 is located at one end of a back light support member 12 in such a manner as to be surrounded with a lamp housing 10. One end of the lamp housing 10 is internally inserted in and secured to the lamp holder 6. The wire 4 is connected, via a through hole formed in the interior of the lamp holder 4, to an electrode 8 of the lamp 4 to which it applies a supply voltage. To this end, the wire 4 is usually connected to the electrode 8 of the lamp 2 by the soldering method using lead-containing solder.

When the electrode 8 of the lamp 2 is connected to the wire 4 by the soldering method using lead-containing solder, however, lead penetrates into the core of wire 4 due to capillary action becomes cured. When lead penetrates and cures in the conductive core of a wire, the wire becomes brittle and subject to breaking. As a result, if the wire 4 is moved in the course of carrying out the assembly, inspection and/or transportation of the LCD module, then the wire 4 is liable to deteriorate or break, thereby generating the serious problem of disabling the LCD.

### **SUMMARY OF THE INVENTION**

Accordingly, it is an object of the present invention to provide a wire-connecting device that is effective in securing a wire while preventing a break of the wire.

A further object of the present invention is to provide a wire-connecting device that is capable of preventing lead penetration in a soldering process employing lead-containing solder.

In order to achieve these and other objects of the invention, a wire-connecting device according to one aspect of the present invention includes a clamping member for pressing and securing the electrode to a wire.

A wire-connecting device according to another aspect of the present invention connects an electrode to a wire by a soldering method employing lead-containing solder, and includes a shut-off member for preventing lead from penetrating into the conductive core of the wire.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

These and other objects of the invention will be apparent from the following detailed description of the embodiments of the present invention with reference to the accompanying drawings, in which:

Figure 1 is an exploded view of a soldering part between a lamp and a wire in a conventional LCD back light unit;

Figure 2 illustrates a soldered state between the lamp and the wire shown in Figure 1;

Figure 3 is an exploded view of a wire-connecting device according to a first embodiment of the present invention;

Figure 4A is an exploded view of a wire-connecting device according to a second embodiment of the present invention;

Figure 4B illustrates a soldering part between the wire and the lamp to which the wire-connecting device in Figure 4a is applied;

Figure 5 is an exploded view of a wire-connecting device according to a third embodiment of the present invention;

Figure 6 is an exploded view of a wire connecting device according to a fourth embodiment of the present invention; and

Figure 7 is an exploded view of a wire-connecting device according to a fifth

embodiment of the present invention.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring to Figure 3, there is shown a wire-connecting device according to a first embodiment of the present invention. The wire-connecting device includes a clamp 18 for connecting an electrode 8 of a lamp 2 to a conductive core 16 of a wire 4 by a press fit method.

In Figure 3, the clamp 18 includes a wire clamping part 18A pressed and secured to the wire 4, a core clamping part 18B pressed and secured to the core 16, and an electrode clamping part 18C pressed and secured or soldered to the electrode 8 of the lamp 2. In this embodiment of clamp 18, the core clamping part 18B is pressed to the core 16 and the electrode clamping part 18C is pressed or soldered to the electrode 8 of the lamp 2 to connect the wire 4 to the lamp 2. To this end, the clamping part 18 is made from a flexible conductive material that may be crimped if desired. Also, the wire clamping part 18A of the clamping part 18 is pressed to the wire 4 to affix the wire 4. As described above, the core 16 of the wire 4 and the electrode 8 of the lamp 2 are connected to each other by the clamp 18 without using the conventional soldering method employing lead-containing solder. Further, lead penetration by capillary action is prevented by the clamp 18 upon soldering, thereby preventing deterioration or breakage of the wire 4 caused by a curing of lead penetrating into the core 16.

Figure 4A shows a wire connecting device according to a second embodiment of the present invention, and Figure 4B shows a soldering part between a wire and a lamp to which the wire connecting device in Figure 4A is applied. Referring to Figure 4A, the wire-connecting device includes a clamp 20 for pressing the wire side of a connection between a

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wire 4 and an electrode 8 of a lamp 2 where the connection is made by the soldering method employing lead-containing solder. The clamp 20 is pressed and secured to the wire 4 close to the soldering part between the conductive core 16 and the electrode 8 of the lamp 2. In this case, the clamp 20 is made from a flexible material that may be crimped. Thus, when the

5 conductive core 16 of the wire 4 is connected to the electrode 8 of the lamp 2 by the soldering method employing lead-containing solder, the clamp 20 prevents penetration of lead into the conductive core 16. By preventing lead penetration into the conductive core 16 of wire 4, the wire 4 does not become brittle as a result of penetrated lead curing in the conductive core 16. Thus, unlike the prior art, the wire 4 is not susceptible to deterioration and breakage when employing the wire-connecting device of the present invention.

Referring now to Figure 5, there is shown a wire-connecting device according to a third embodiment of the present invention. The wire-connecting device includes a clamp 22 having snap-fitted parts to press and connect a lamp 2 to a wire 4.

In Figure 5, the clamp 22 includes a lamp clamping part 22A pressed and secured to the lamp 2 containing an electrode 8. The clamp 22 further includes a core clamping part 22B pressed and secured to a conductive core 16 of wire 4, and a wire clamping part 22C pressed and secured to the wire 4. The lamp clamping part 22A is snap-fitted perpendicularly to the longitudinal axis of lamp 2 so as to press and secure the lamp 2 and the electrode 8 thereof. The core clamping part 22B is pressed and secured, or soldered to the conductive

15 core 16 of the wire 4. The wire clamping part 22C presses and secures the wire 4. The clamp 22 is made from a flexible conductive material that may optionally be crimped. By this clamp 22, the electrode 8 of the lamp 2 and the conductive core 16 of the wire 16 are securely

20 connected to each other to permit conduction. Wire clamping part 22c functions in a manner

similar to the clamp 20 of Figures 4A and 4B, in that it prevents the penetration of lead by capillary action into the conduction core of wire 4. Thus, when the wire 4 and the electrode 8 of the lamp 2 are connected or soldered to each other with the aid of the clamp 22, deterioration or breakage of the wire 4 caused by the curing of lead penetrated into the conductive core 16 is prevented.

Referring to Figure 6, there is shown a wire-connecting device according to a fourth embodiment of the present invention. The wire-connecting device includes a clamp 24 having snap-fitted parts to press and connect a lamp 2 to a wire 4.

In Figure 6, the clamp 24 includes a lamp clamping part 24A pressed and secured to an electrode 8 of the lamp 2, a core clamping part 24B pressed and secured to a conductive core 16, and a wire clamping part 24C pressed and secured to the wire 4. The lamp clamping part 24A is snap-fitted perpendicularly to the longitudinal axis of lamp 2 and is pressed and secured to the electrode 8 of the lamp 2. The core clamping part 24B presses and secures the conductive core 16 of the wire 4, and the wire clamping part 24C presses and secures the wire 4. The clamp 24 is made from a flexible conductive material that may be crimped if desired. By this clamp 24, the electrode 8 of the lamp 2 and the conductive core 16 of the wire 4 is connected to each other and thus conducted. As described above, the wire 4 and the electrode 8 of the lamp 2 are connected to each other with the aid of the clamp 24 without using the soldering method employing lead-containing solder, thereby preventing penetration and curing of lead in the conductive core 16, as well as any resultant deterioration or breakage.

Referring to Figure 7, there is shown a wire-connecting device according to a fifth embodiment of the present invention. The wire-connecting device includes a clamp 26 having a hole 26C for inserting an electrode 8 of a lamp 2 to press and secure a wire 4.







**What is claimed is:**

1           1.       A device for connecting an electrode to a wire having an exterior sheath and a  
2       conductive core, comprising:

3           a clamping member for pressing and securing the electrode to the wire.

1           2.       The device of claim 1, wherein said clamping member comprises:

2           a first clamping part for pressing and securing the wire;

3           a second clamping part for pressing and securing the conductive core of the wire; and

4           a third clamping part for pressing and securing the electrode.

1           3.       The device of claim 2, wherein said electrode is an electrode connected to a  
2       lamp for a liquid crystal display module, and the third clamping part presses and secures the  
3       lamp including the electrode.

4           4.       The device of claim 2, wherein said second clamping part is affixed to said  
wire at said exterior sheath proximate said second clamping part.

1           5.       The device of claim 2, wherein said third clamping part has a portion snap-  
2       fitted perpendicularly to the first and second clamping parts.

1           6.       The device of claim 2, wherein said electrode and said third clamping part are  
2       connected to each other by a soldering method employing lead-containing solder.

7. The device of claim 1, wherein said clamping member comprises:  
a first clamping part for pressing and securing the wire;  
a second clamping part for pressing and securing the conductive core of the wire; and  
a sleeve for receiving and securing the electrode.

8. The device of claim 7, wherein said electrode is connected to the clamping member by a soldering method employing lead-containing solder.

9. The device of claim 7, wherein said electrode is connected to the clamping member by crimping said clamping member.

10. The device of claim 2, wherein said conductive core of the wire and said second clamping member are connected to each other by a soldering method employing lead-containing solder.

11. The device of claim 1, wherein said clamping member is made from a flexible conductive material.

12. The device of claim 1, wherein said clamping member is crimped to one of said electrode and said wire.

13. The device of claim 7, wherein said conductive core of the wire and said

second clamping member are connected to each other by a soldering method employing lead-containing solder.

14. A device for connecting an electrode to a wire comprising a conductive core and an exterior sheath, wherein the electrode and the wire are connected to each other by a soldering method employing lead-containing solder, said device comprising:

a shut-off member for preventing lead from penetrating into said conductive core of the wire.

15. The device of claim 14, wherein said shut-off member is a clamp pressed and secured flexibly to the wire.

16. The device of claim 14, wherein said shut-off member is crimped.

17. The device of claim 14, wherein said shut-off member is secured to said wire at said exterior sheath proximate said conductive core.

## ABSTRACT

A wire-connecting device that is capable of preventing deterioration or breakage of a wire connected to a lamp electrode of a liquid crystal display module. In the device, a clamp presses and secures the electrode to the wire. The lamp electrode and the wire are connected to each other by means of the clamp, providing a secure conductive connection. The wire-connecting device also prevents the penetration of lead by capillary action into the conductive core of the wire, thereby preventing the wire from becoming brittle and subject to breakage as a result of penetrated lead curing in the conductive core of the wire.

Fig 1  
CONVENTIONAL ART

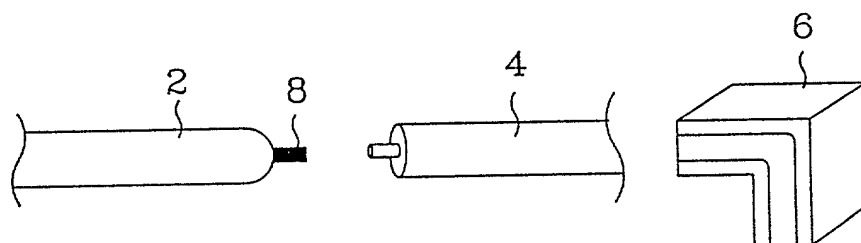


Fig 2  
CONVENTIONAL ART

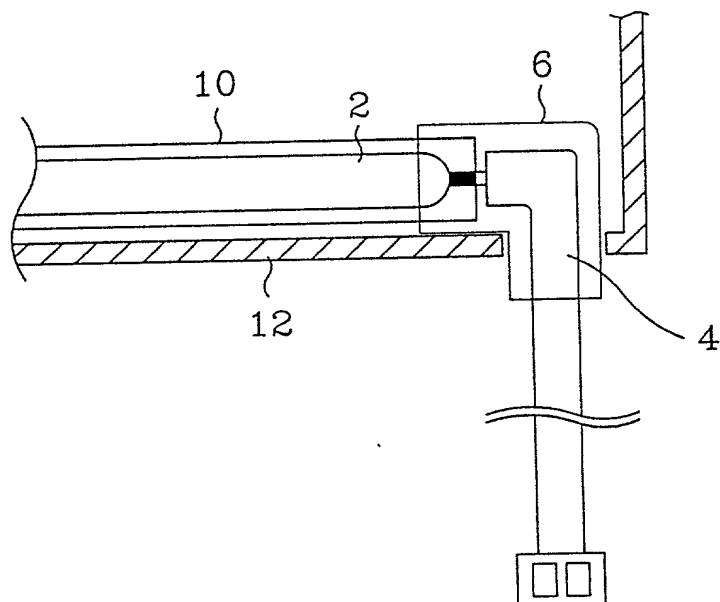


Fig 3

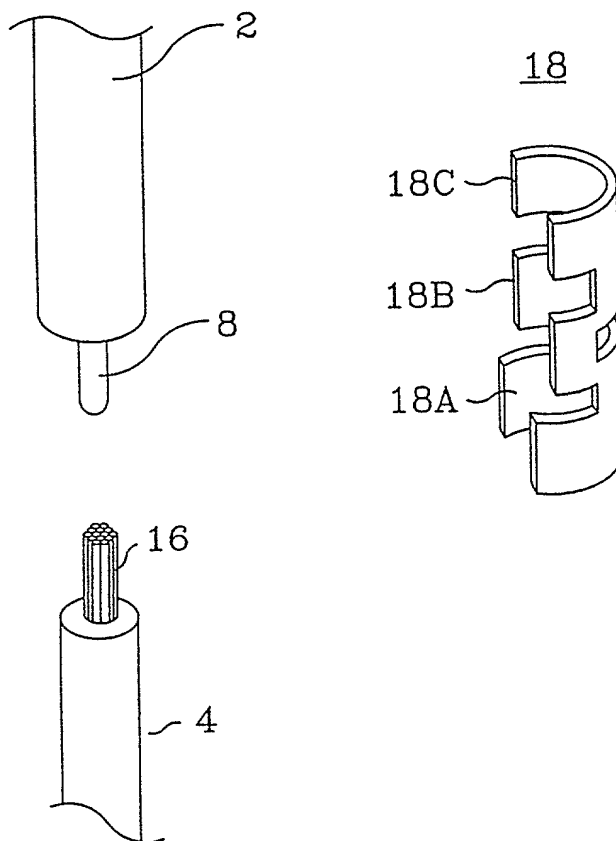




Fig 4A

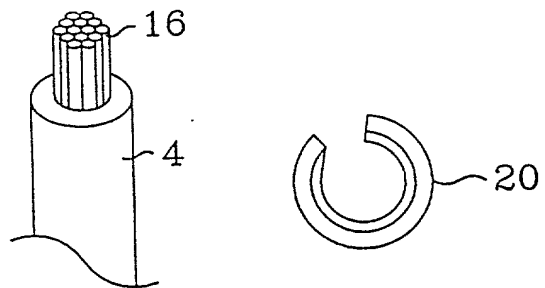
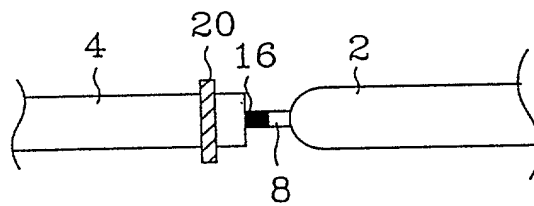


Fig 4B



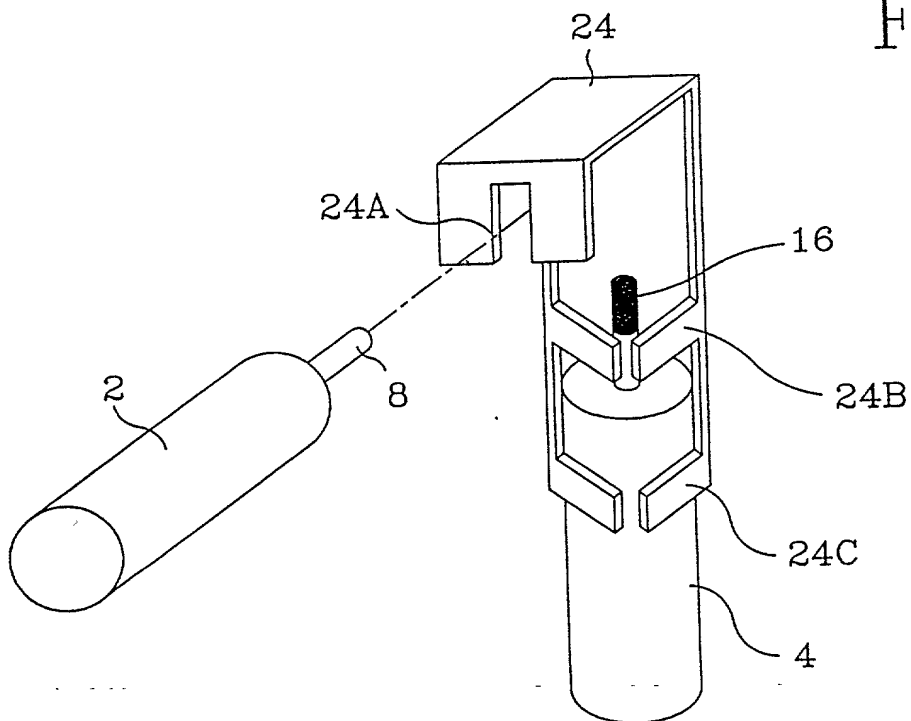
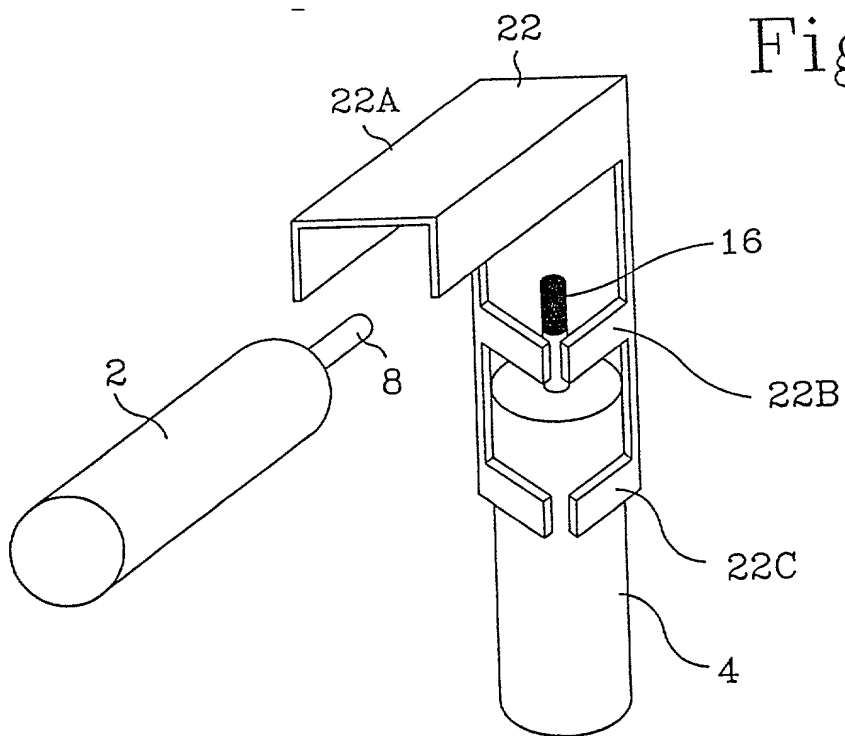
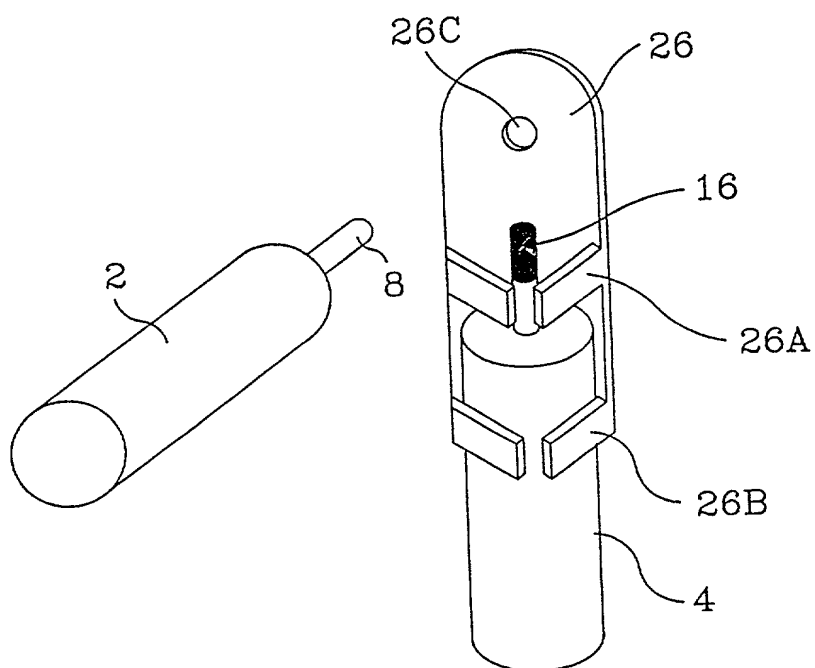


Fig 7



Docket No.: 8733.20058

## Declaration, Power of Attorney and Petition

WE (I) the undersigned inventor(s), hereby declare(s) that:

My residence, post office address and citizenship are as stated below next to my name.

We (I) believe that we are (I am) the original, first, and joint (sole) inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled

### WIRE CONNECTING DEVICE

the specification of which

☒ is attached hereto.

☐ was filed on

as Application Serial No.

and amended on

☐ was filed as PCT international application

Numbe

on

and was amended under PCT Article 19

on

(if applicable).

We (I) hereby state that we (I) have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

We (I) acknowledge the duty to disclose information known to be material to the patentability of this application as defined in Section 1.56 of Title 37 Code of Federal Regulations

We (I) hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed Prior Foreign Application(s)

Application No.	Country	Day/Month/Year	Priority Claimed	
1999-20347	Korea	3 June 1999	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
			<input type="checkbox"/> Yes	<input type="checkbox"/> No
			<input type="checkbox"/> Yes	<input type="checkbox"/> No

We (I) hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below.

_____ (Application Number)	_____ (Filing Date)
_____ (Application Number)	_____ (Filing Date)

We (I) hereby claim the benefit under 35 U.S.C. §120 of any United States application(s), or §365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. §112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR §1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

Application Serial No	Filing Date	Status (pending, patented, abandoned)
_____	_____	_____
_____	_____	_____

And we (I) hereby appoint Steven B. Kelber, Reg. No. 30,073, Marc R. Labgold, Ph.D., Reg. No. 34,651, Song K. Jung, Reg. No. 35,210; Sharon E. Crane, Ph.D., Reg. No. 36,113; Laura A. Donnelly, Reg. No. 38,435; Catherine Bax Richardson, Reg. No. 39,007; Kenneth D. Springer, Reg. No. 39,843; Russell O. Paige, Reg. No. 40,758; James M. Heintz, Reg. No. 41,828; Laura D. Nammo, Reg. No. 42,024 and Amy L. Miller, Reg. No. 43,804 and as our (my) attorneys, with full powers of substitution and revocation, to prosecute this application and to transact all business in the Patent Office connected therewith, and we (I) hereby request that all correspondence regarding this application be sent to Steven B. Kelber of Long Aldridge & Norman LLP, Attorneys At Law, 6<sup>th</sup> Floor, 701 Pennsylvania Avenue, N.W., Washington, D.C. 20004.

We (I) declare that all statements made herein of our (my) own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

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